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@ DWQ MEETING

Moab Salt, Inc. memo

M/019/005

Date: September 18, 1991

To: E.K. York Moab, Utah

From: R.L. Looney RL Moab, Utah

Subject: Electrical Leak Detection Testing in 3E Pond

Attempts to locate the holes in the bottom vinyl of 3E pond, using the Electrical Leak Detection method outlined in the memo "Electrical Leak Detection Testing" dated July 26, 1991, were conducted on September 16 and 17.

September 16

The external ground rod was driven outside the vinyl coverings in damp soil at the southeast corner of the pond. The positive electrode was positioned in the brine covering the base salts. The detector was moved around the pond to observe electrical anomalies. After several attempts, it was decided that the brine depth was insufficient to facilitate the flotation of the detector and testing was postponed until the following day.

During the afternoon and evening of September 16, additional brine was added and testing was resumed on September 17.

September 17

Several attempts were made to duplicate the tests conducted in the test pond with no success at locating holes in the vinyl. Repositioning of the electrodes in the brine and soil did nothing to provide indications of leaks. The voltage throughout the pond, regardless of direction, was always the same and decreased as it was moved from the anode.

It is important to note that the brine transferred from 3D to 3E was less saturated that the original brine in 3E and that walking through the pond caused mixing which could be observed on the meter due to the changes in conductance.

Before termination of testing, a hole was deliberately punched in the pond bottom to provide a known circuit. The detector was passed over the hole and it could not be detected as was done in the test pond.

Conclusion

From the testing carried out in 3E pond, it can only be assumed that due to the voltage level and the mass of thirteen acres of brine at a depth of six inches, the observable voltage was so scattered that the streaming potential of the electricity leaving the brine through a hole cannot be observed in the manner that it was observed in the test pond.

Moab Salt, Inc. memo

Date: July 26, 1991

To: E.K. York Moab, Utah

From: R.L. Looney RL Moab, Utah

Subject: Electrical Leak Detection Testing

Test Pond

1. Location - catch pond below 20 well.

2. Pond construction - a ground grid was constructed and placed on top of existing evaporated salts in the catch pond. A two foot high dike was constructed of road salt and the vinyl was installed. (Detail A)

3. Vinyl - a less expensive vinyl of known integrity was purchased from Reef Industries of Houston, Texas and measured 50' x 50'.

Test Equipment

1. Power supply - 125 volt DC with a maximum output of 2 amps.

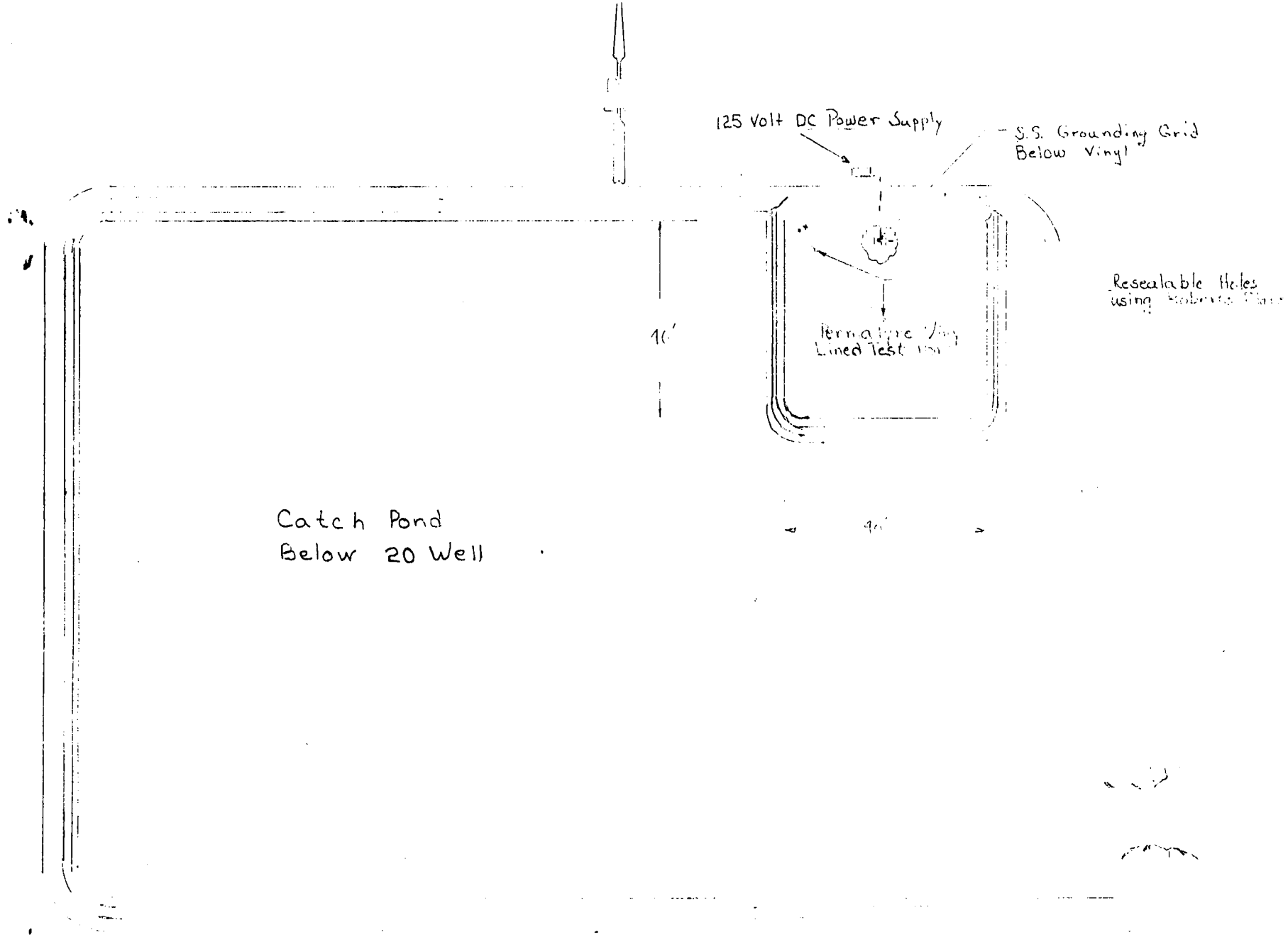
2. Detector Apparatus - see Detail B.

Best Test Scenario

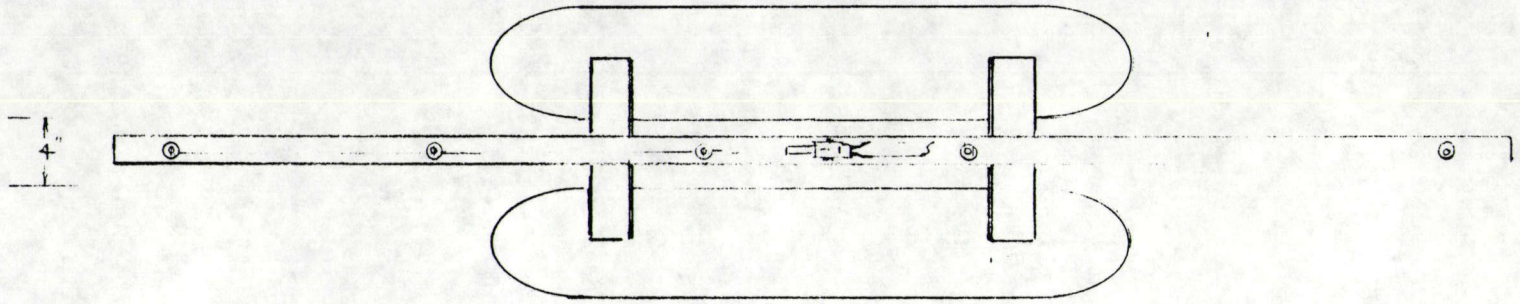
Voltage is applied to approximately 8" of brine above the vinyl and the ground grid below the vinyl is connected to the negative terminal of the output side of the power supply. A streaming potential of electricity will develop between the positive terminal and a hole in the vinyl. By positioning the positive and negative leads of a volt/ohm meter in line with the streaming potential of electricity, the detector can be moved from the source to the hole, showing an increase in electricity until the negative lead of the meter passes over the hole. The hole is located when a sudden decrease in the electricity is observed. If another hole is positioned in line with the source and beyond the first hole, the voltage observed will immediately begin elevating, but will not attain the same level as before. The second hole will be located the same as the first, but with less voltage observed.

RLL:rc

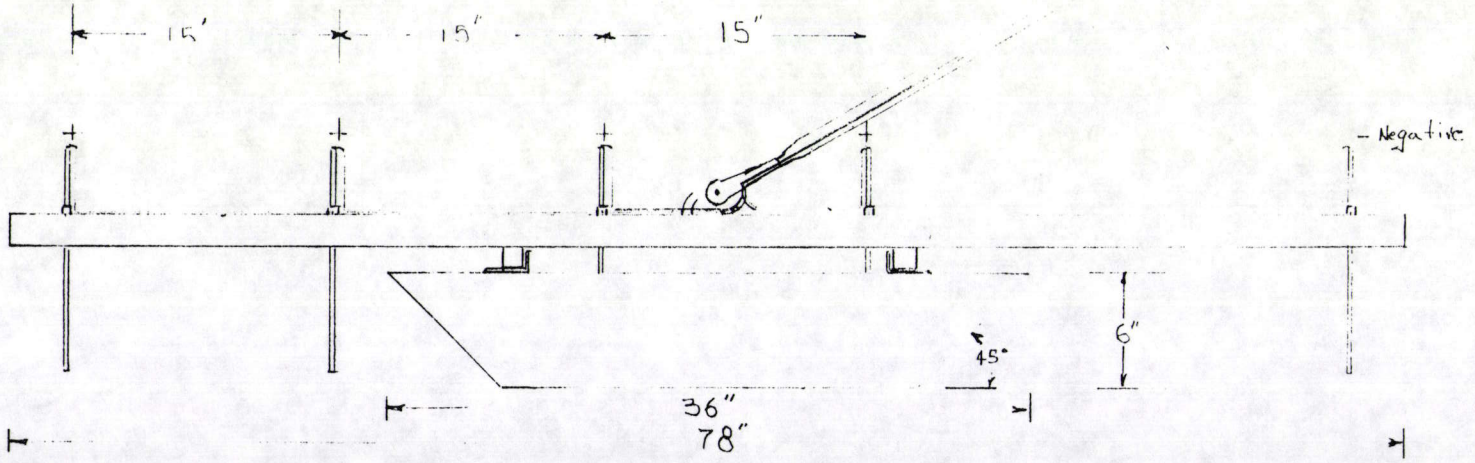
DETAIL A
TEST POND



DETAIL B
DETECTOR APARATUS



Volt/Ohm Meter



October 2, 1990

E.K. York Moab, Utah

R.L. Looney Moab, Utah

Test Outline and Results for Electrical Leak Detection Method

Test Purpose

In the literature published by Southwest Research Institute (SWI) and telephone conversations with Glenn Darilek at that facility, there were no survey results available for pond systems such as those in use at Moab Salt. Due to the high costs anticipated, both in a formal bid from SWI and a verbal bid from Dick Fox with Practical Geophysics in Salt Lake City, Utah, the decision was made to test the method for reliability and sensitivity using a small test pond and a vinyl liner of known integrity. (See accompanying rough drawing.)

Common Test Conditions

The following test conditions were common to the three tests performed:

1. Power Source - 125 VDC, maximum 2 amp output.
2. All liquid and liquid/solids tests were conducted at a depth of 8 inches.
3. The positive lead from the power source was introduced into the liquid being tested and suspended 1 1/2" to 2" above the bottom of the liquid. The negative lead was connected to a ground rod placed in the damp soil around the vinyl.
4. Voltages were observed and recorded using a digital volt/ohm meter with the test leads placed 3 feet apart.
5. For obvious reasons, the power supply was always disconnected when changes were made in test conditions.

Test Number 1

1. Water to the 8 inch depth.
2. Observed voltage distribution with no holes in the vinyl liner.
3. Cut #1 hole 2 1/2" long in the approximate center of the vinyl. Observed and recorded voltages.
4. Cut #2 hole 2 1/2" long in the corner of the vinyl. Observed and recorded voltages for both slits.

Results:

	Voltages Observed
No Leaks	1 to 15 millivolts throughout pond
#1 Leak Only	700 to 830 millivolts at leak location
1 and #2 Leaks Open	
#1	660 to 780 millivolts at leak location
#2	5 to 130 millivolts at leak location

Test Number 2

1. Leaks from Test No. 1 were dried, cleaned and covered with vinyl pipe wrap.
2. KCl/NaCl saturated brine to the 8 inch depth.
3. Repeated Steps 2 through 4 of Test No. 1 removing the pipe wrap cover in steps 3 and 4 rather than cutting new slits.

Results:

	Voltages Observed
No Leaks	30 to 70 millivolts throughout pond
#1 Leak Only	700 to 850 millivolts at leak location
#1 and #2 Leaks Open	
#1	700 to 850 millivolts at leak location
#2	100 to 160 millivolts at leak location

Test Number 3

1. Leaks were not covered.
2. Bottom of pond was covered with 6 inches of medium grade salt.
3. Sufficient saturated brine was added to bring the combined depth of the pond to 8 inches.
4. Observed and recorded voltages for both leaks.

Results:

The results were the same as Test No. 2.

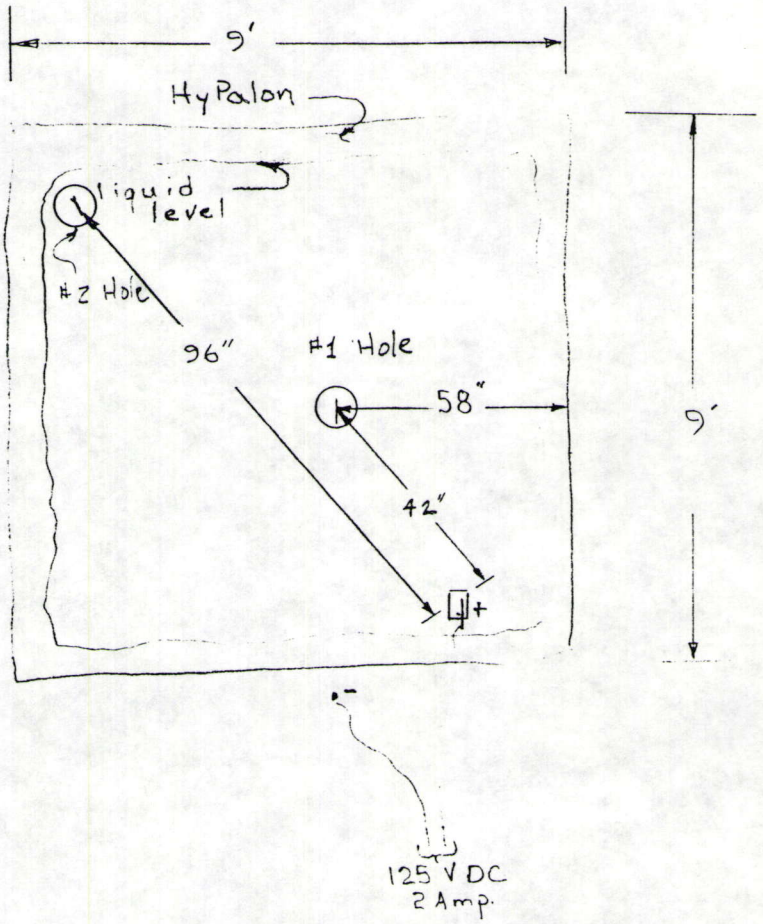
	Voltages Observed
No Leaks	30 to 70 millivolts throughout pond
#1 Leak Only	700 to 850 millivolts at leak location
#1 and #2 Leaks Open	
#1	700 to 850 millivolts at leak location
#2	100 to 160 millivolts at leak location

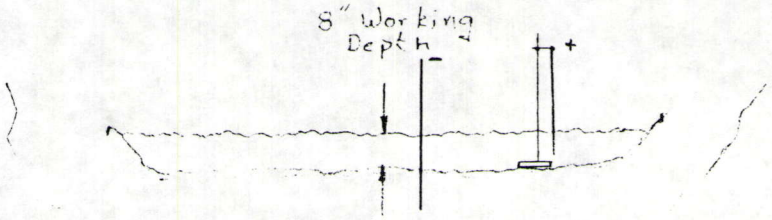
Notes

1. Although amperage and voltage were both observed, voltage provided the most sensitivity.
2. Without exception, the slits were located within two inches of their relative location.
3. Voltage increased as the detector probes were moved towards the slit.
4. Leak location was correlated with the highest voltage observed.
5. The single most important factor to leak location in these tests was to maintain both the detector probes, simultaneously, in the current path between the power source and the leak.

Attachment

RLL:rc


9'
HyPalon
liquid level
#2 Hole
96"
#1 Hole
58"
42"
9'
-
+
125 V DC
2 Amp.


8" Working Depth
-
+